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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/027,592	12/19/2001	Tony P. Chiang	M-11466-8C US	1875

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EXAMINER	
FULLER, ERIC B	

ART UNIT	PAPER NUMBER
1762	

DATE MAILED: 04/19/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/027,592	CHIANG ET AL.	
	Examiner	Art Unit	
	Eric B. Fuller	1762	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 February 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sherman (US 6,342,277 B1) in view of Gruenwald et al. (US 5,009,738) in further view of Lei et al. (US 5,516,367).

Sherman teaches a process where a vacuum evacuates a process chamber, an atomic layer deposition gas is fed into a process chamber, the chamber is evacuated again, a second reactive gas is supplied to the chamber, and the process cycle is completed with another evacuation (figure 2; column 5, lines 5-30). It is taught that the exhaust valve is open during evacuation and closed during the gas feeding steps (column 6, lines 28-40). This reads on varying the conductance of the exit gas by varying the restriction though which the gas exists the chamber. This valve also inherently would cause the flux and pressure of the feed steps to vary from the flux and pressure of the exhausting steps. The reactive gas is activated by a plasma discharge (column 12, lines 62) from an RF source (column 6, line 24), such that it includes ions and reactive atoms. It is taught that the exhausting steps are performed by evacuating the chamber while flowing non-activated reactive gas (column 7, lines 55-67), which

reads on purging. Figure 2 shows that the gas flows, when flowing, are constant. The reference fails to teach that translating a feature within the chamber varies the conductance of the exhaust gas.

However, Gruenwald teaches a perforated plate that is rotated above the exhaust openings of a vapor processing chamber (column 7, lines 1-10; column 4, lines 26-33). The plate controls the conductance of the exhaust gases so that important parameters such as dwell times may be accurately controlled. Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to use the perforated disk in the chamber of Sherman to vary the conductance of the exhaust gas as required. By doing so, parameters such as dwell time may be accurately controlled. Gruenwald teaches the disk below the substrate, thus fails to explicitly teach that the translating feature circumscribes the periphery of the substrate.

However, Lei teaches a radial ring that translates in order to control the gas flow through radial apertures that are positioned around the periphery of the substrate in order to increase the uniformity of the process gas around the substrate (figure 9; column 7, lines 23-48). From this, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to use exhaust ports that circumscribe the periphery of the substrate in the process taught by Sherman, in view of Gruenwald. By doing so, one would reap the benefits of increasing the uniformity of the process gases around the periphery of the substrate.

As to claims 5 and 6, although the reference does not explicitly teach that the pressure and flux of the chamber vary inversely with the conductance of the exhaust, it is the position of the examiner that this is an inherent phenomenon.

As to newly added claims 21 and 22, figure 3 of Gruenwald shows how a portion of the bottom wall is moved such that the cross area of the gas exit openings are increased and decreased.

Claims 1, 2, 4-8, 10, 14, and 17-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suntola et al. (US 4,413,022) in view of Suzuki (US 2001/0048981 A1) and Gruenwald et al. (US 5,009,738) in further view of Lei et al. (US 5,516,367).

Suntola teaches a method of fabricating a thin film on a substrate by using atomic layer deposition (column 1, lines 35-51). As the first reagent gas, or stream of reactive atoms, is flowed into the chamber, the pressure is increased and held at a certain pressure. The pressure is then allowed to drop as the first reagent is purged. As the second reagent is flowed into the chamber, the pressure is allowed to rise again to a constant amount. The cycle is completed with a purging at reduced pressure again (figure 1; column 4, lines 1-52). It is the examiners position that as one varies the pressure, the flux is varied as well. The reference fails to teach these pressure/flux changes as being controlled by exit conductance.

However, Senzaki teaches a process where pressure is varied in a chamber. It is taught that controlling the conductance of the exhaust system, while keeping the inflow constant, controls the pressure (0030). Therefore, it would have been obvious at

the time the invention was made to a person having ordinary skill in the art to perform the pressure changes of Suntola by leaving the mass of the inflow constant and adjusting the conductance of the exhaust stream. By doing so, one would have a reasonable expectation of success. The combined references fail to teach that translating a feature within the chamber varies the conductance of the exhaust gas.

However, Gruenwald teaches a perforated plate that is rotated above the exhaust openings of a vapor processing chamber (column 7, lines 1-10; column 4, lines 26-33). The plate controls the conductance of the exhaust gases so that important parameters such as dwell times may be accurately controlled. Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to use the perforated disk in the chamber of Suntola to vary the conductance of the exhaust gas as required. By doing so, parameters such as dwell time may be accurately controlled. Gruenwald teaches the disk below the substrate, thus fails to explicitly teach that the translating feature circumscribes the periphery of the substrate.

However, Lei teaches a radial ring that translates in order to control the gas flow through radial apertures that are positioned around the periphery of the substrate in order to increase the uniformity of the process gas around the substrate (figure 9; column 7, lines 23-48). From this, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to use exhaust ports that circumscribe the periphery of the substrate in the process taught above. By doing so, one would reap the benefits of increasing the uniformity of the process gases around the periphery of the substrate.

Claims 3, 9, 11-13, 15, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suntola et al. (US 4,413,022) in view of Suzuki (US 2001/0048981 A1) and Gruenwald et al. (US 5,009,738) in further view of Lei et al. (US 5,516,367), as applied to claims 1 and 7 above, and further in view of Sherman (US 6,342,277 B1).

It has been shown above that the combination of Suntola, Suzuki, Gruenwald, and Lei teaches the limitations of claims 1 and 7. These references fail to teach that the reactive gas is plasma from an RF source. However, Sherman teaches that using plasma as the reactive gas allows for quicker deposition times (column 7, lines 35-65). Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to utilize plasma in the process of Suntola, with the modifications made obvious by Suzuki, Gruenwald, and Lei. By doing so, deposition times are reduced. An RF source ignites the plasma (column 6, line 24).

Response to Arguments

Applicant argues that Gruenwald teaches rotating the device, and not translating. This is not found convincing. The examiner does not recognize how translating may exclude rotating. As the holes on the device are moved past one another, this reads on translating.

Applicant argues that Lei fails to teach varying the conductance. This is not found convincing. Gruenwald teaches varying the conductance all ready. Lei is simply used to teach that other orientations of exhaust flow are known. To use other

configurations of exhaust flow, with a corresponding flow-controlling plate already taught by Gruenwald, would have been obvious to one of ordinary skill in the art.

Specifically, Gruenwald teaches controlling the conductance by translating a device to control the diameter of the exhaust holes and Lei teaches having the exhaust holes circumscribe a periphery of the substrate. Combining the two references reads on the applicant's claims.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eric B. Fuller whose telephone number is (571) 272-1420. The examiner can normally be reached on Mondays through Thursdays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tim Meeks, can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

EBF

TIMOTHY MEEKS
SUPERVISORY PATENT EXAMINER